

WHAT IS CLAIMED IS:

Claim 1:

A throttle system, wherein  
5 a through hole for the shaft of a throttle valve  
to be inserted through is formed,  
a recession, with a diameter larger than the  
through hole, for installing a bearing that supports  
the shaft to allow to rotate is formed outside the  
10 through hole,  
and an enlarged recession larger than the through  
hole is formed between the through hole and recession;  
a bearing is installed in the recession so as to  
support the shaft to allow to rotate; and  
15 a seal structure is provided at an area including  
the through hole or an area including the boundary  
between the enlarged recession and through hole.

Claim 2:

20 A throttle system according to Claim 1, wherein  
the enlarged recession is smaller in diameter than the  
recession and a combination of the recession and  
enlarged recession forms a stepped recession.

Claim 3:

A throttle system according to Claim 1, wherein the seal structure is constructed of seal material made of fluorocarbon resin, polyether etherketone  
5 resin, polyimide resin, polyamide resin, or polyphenylene sulfide resin.

Claim 4:

A throttle system according to Claim 1, wherein  
10 the seal structure is so constructed that the area of a cross section in the enlarged recession which, including the axis of the shaft, is parallel to the axis is made equal to or smaller than the area of a cross section in the gap between the circumferential  
15 surface of the shaft and inner wall of the through hole which crosses the axis of the shaft.

Claim 5:

A throttle system which is provided with a  
20 throttle body, comprising a shaft that crosses the suction passage of a throttle body and can support the throttle valve midway in the suction passage, bearings that support the shaft to allow to rotate axially, seal material, through holes for the shaft to be  
25 inserted through the throttle body across the suction

passage, and stepped recessions for installing the bearings, and controls the suction air flow in an internal combustion engine by operating the throttle valve,

5            wherein seal material is provided between the suction passage side end of the bearing and suction passage side opening of the through hole so that the contact surface between the seal material and stepped recession side opening of the through hole and the  
10           contact surface between the seal material and shaft surface are sealed.

Claim 6:

          A throttle system which is provided with a  
15           throttle body, comprising a shaft that crosses the suction passage of a throttle body and can support the throttle valve midway in the suction passage, bearings that support the shaft to allow to rotate axially, seal material, through holes for the shaft to be  
20           inserted through the throttle body across the suction passage, and stepped recessions for installing the bearings, and controls the suction air flow in an internal combustion engine by operating the throttle valve,

25           wherein seal material is provided between the

suction passage side end of the bearing and suction  
passage side opening of the through hole so that the  
contact surface between the seal material and inside  
circumference of the stepped recession or through hole  
5 and the contact surface between the seal material and  
shaft surface are sealed.

Claim 7:

A throttle system which is provided with a  
10 throttle body, comprising a shaft that crosses the  
suction passage of a throttle body and can support the  
throttle valve midway in the suction passage, bearings  
that support the shaft to allow to rotate axially,  
seal material, through holes for the shaft to be  
15 inserted through the throttle body across the suction  
passage, and stepped recessions for installing the  
bearings, and controls the suction air flow in an  
internal combustion engine by operating the throttle  
valve,

20 wherein the shaft is made into a stepped shape  
having a larger diameter on the suction passage side  
and smaller diameter on the throttle body outward side  
and the contact surface between the seal material and  
side surface of the stepped shape of the shaft and the  
25 contact surface between the seal material and inside

circumference of the stepped recession or inside  
circumference of the through hole are sealed.

Claim 8:

5           A throttle system according to any one of Claims 5,  
6 and 7, wherein the bearing is an anti-friction  
roller, the diameter of the seal material is equal to  
or smaller than that of the anti-friction bearing  
outer ring, and there is provided a stepped recession,  
10 as if the step is directed through the seal material,  
in which the diameter of one recession is equal to or  
larger than the anti-friction roller inner ring and  
smaller than the outer ring and the diameter of the  
other recession is equal to or larger than that of the  
15 shaft and equal to or smaller than that of the through  
hole.

Claim 9:

20           A throttle system which is provided with a  
throttle body, comprising a shaft that crosses the  
suction passage of a throttle body and can support the  
throttle valve midway in the suction passage, bearings  
that support the shaft to allow to rotate axially,  
through holes for the shaft to be inserted through the  
25 throttle body across the suction passage, and stepped

recessions for installing the bearings, and controls the suction air flow in an internal combustion engine by operating the throttle valve,

wherein

5           a gap surrounded by the stepped recession, shaft and bearing of the throttle body or a gap between the through hole and shaft of the throttle body is filled with adaptive material with high adaptivity and lubricity in the course between the suction passage  
10 side end of the bearing and the suction passage side opening of the through hole.

Claim 10:

          A throttle system which is provided with a  
15 throttle body, comprising a shaft that crosses the suction passage of a throttle body and can support the throttle valve midway in the suction passage, bearings that support the shaft to allow to rotate axially, a seal mechanism, through holes for the shaft to be  
20 inserted through the throttle body across the suction passage, and stepped recessions for installing the bearings, and controls the suction air flow in an internal combustion engine by operating the throttle valve,

25           wherein

the seal mechanism is so provided that the  
circumferential cross-sectional area in a gap  
surrounded by the shaft, bearing and stepped recession  
is equal to or smaller than the axial cross-sectional  
5 area in a gap between the shaft and through hole.